

3/12/04

09/981,277

(FILE 'HOME' ENTERED AT 16:32:53 ON 12 MAR 2004)

FILE 'ZCA' ENTERED AT 16:37:50 ON 12 MAR 2004

E SDT/CT
E E3+ALL/CT
E ION ETCHING/CT
E E3+ALL/CT
E SPIN DEPENDENT TUNNELING/CT
E MRAM/CT
E MAGNETIC RAM/CT

FILE 'HCAPLUS' ENTERED AT 16:39:37 ON 12 MAR 2004

L1 577 S SDT OR (SPIN(A)DEPEND####) (A)TUNNEL####
L2 395740 S PLANAR? OR TRUNCATE? OR MESA# OR TABLE OR
TABLES OR TABLETOP# OR FLAT##### OR ROUND#####
L3 1005028 S PEAK# OR CRAG### OR COLUMN### OR POST# OR PINNACLE# OR CREST####
L4 560 S MRAM OR MAGNET##### (2A) (RAM OR RANDOM(A)ACCESS)
L5 449497 S (SHAP#### OR TOPOG#####)
L6 26705 S (ION OR SPUTTER?) (2A) (ETCH#### OR MILL####)
L7 4084 S (FERROMAGNET? OR FM) (2A)COUPL?

FILE 'ZCA' ENTERED AT 16:40:42 ON 12 MAR 2004

E RANDOM ACCESS MEMORY/CT
E E4+ALL/CT

FILE 'HCAPLUS' ENTERED AT 16:41:25 ON 12 MAR 2004

L8 20287 S (MEMORY DEVICE#)/CT
L9 2015 S L8(L)MAGNET?
L10 2842 S L1 OR L4 OR L9
L11 411 S L10 AND ((L2 OR L3) OR L5 OR L6 OR L7)
L12 156720 S FLAT? OR TRUNCAT?
L13 40 S L11 AND L12
L14 20 S L13 NOT P/DT NOT PY>2001
L15 3 S L13 AND (WO OR US)/PRC(S)PRD<20011017
L16 10 S L13 NOT L15 NOT PD.B>20011017 NOT L14
L17 33 S (L14 OR L15 OR L16)

File 2:INSPEC 1969-2004/Feb W5
 (c) 2004 Institution of Electrical Engineers

Set	Items	Description
S1	59	E1,E4
S2	143	E4-E15
S3	8	S1 AND S2
S4	7	S3 NOT PY>2001
S5	52969	CC=(B3120J OR B3110M OR B3120B OR B1265D OR A7570C OR A734-0G)
S6	20284	(ION OR SPUTTER?) (2N)ETCH???
S7	476	S5 AND S6
S10	563	SDT OR (SPIN(N)DEPEND?????) (N)TUNNEL????
S11	228306	PLANAR? OR TRUNCATE? OR MESA? ? OR TABLE OR TABLES OR TABLETOP? ? OR FLAT???????
S12	196709	PEAK? ? OR CRAG??? OR PINNACLE? ? OR CREST????
S13	333	MRAM OR MAGNETIC(2N) (RAM OR RANDOM(N)ACCESS)
S14	318069	(SHAP???? OR TOPOG?????)
S15	12	CC=(B1265D AND B3120W)
S16	4	S7 AND S10
S17	4	S16 NOT S3

File 350:Derwent WPIX 1963-2004/UD,UM &UP=200416
 (c) 2004 THOMSON DERWENT

Set	Items	Description
---	-----	-----
S1	1	PN='US2002047145'
S2	1746	MC=U14-A04 + MC=U14-A04A
S3	12011	IC='G11C-011/14' + IC='G11C-011/15' + IC='G11C-011/16' + I- C='H01F-010/14' + IC='H01F-010/32' + IC='H01L-027/105' + IC='- H01L-029/94' + IC='H01L-043/08' + IC='H01L-043/12'
S4	12549	S2 OR S3
S5	6311	MRAM OR MAG?(2N) (RAM OR MEMOR???)
S6	6073	MRAM OR MAG??????? (2N) (RAM OR MEMOR????)
S7	104	SDT OR (SPIN(N)DEPEND?????) (N)TUNNEL????
S8	586197	PLANAR? OR TRUNCATE? OR MESA? ? OR TABLE OR TABLES OR TABLETOP? ? OR FLAT???????
S9	69025	PEAK? ? OR CRAG??? OR PINNACLE? ? OR CREST????
S10	1055	MRAM OR MAGNETIC(2N) (RAM OR RANDOM(N)ACCESS)
S11	1068857	(SHAP???? OR TOPOG?????)
S12	0	CC=(B1265D AND B3120W)
S13	1352	S3 AND (S8 OR S9 OR S11)
S14	2	S13 AND S7
S15	1434	S4 AND (S8 OR S9 OR S11)
S16	1	S7 AND S15 NOT S14

File 2:INSPEC 1969-2004/Feb W5
 (c) 2004 Institution of Electrical Engineers
 File 6:NTIS 1964-2004/Mar W1
 (c) 2004 NTIS, Intl Cpyrght All Rights Res
 File 8:Ei Compendex(R) 1970-2004/Feb W5
 (c) 2004 Elsevier Eng. Info. Inc.
 File 25:Weldasearch 1966-2002/Sep
 (c) 2004 TWI Ltd
 File 34:SciSearch(R) Cited Ref Sci 1990-2004/Mar W1
 (c) 2004 Inst for Sci Info
 File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
 (c) 1998 Inst for Sci Info
 File 35:Dissertation Abs Online 1861-2004/Feb
 (c) 2004 ProQuest Info&Learning
 File 65:Inside Conferences 1993-2004/Mar W1
 (c) 2004 BLDSC all rts. reserv.
 File 94:JICST-EPlus 1985-2004/Feb W5
 (c)2004 Japan Science and Tech Corp(JST)
 File 99:Wilson Appl. Sci & Tech Abs 1983-2004/Feb
 (c) 2004 The HW Wilson Co.
 File 103:Energy SciTec 1974-2004/Feb B2
 (c) 2004 Contains copyrighted material
 File 144:Pascal 1973-2004/Feb W5
 (c) 2004 INIST/CNRS
 File 239:Mathsci 1940-2004/Apr
 (c) 2004 American Mathematical Society
 File 241:Elec. Power DB 1972-1999Jan
 (c) 1999 Electric Power Research Inst.Inc
 File 305:Analytical Abstracts 1980-2004/Mar W1
 (c) 2004 Royal Soc Chemistry
 File 315:ChemEng & Biotec Abs 1970-2004/Feb
 (c) 2004 DECHEMA
 File 354:Ei EnCompassLit(TM) 1965-2004/Feb W5
 (c) 2004 Elsevier Eng. Info. Inc.
 File 987:TULSA (Petroleum Abs) 1965-2004/Mar W2
 (c)2004 The University of Tulsa

Set	Items	Description
S1	11238	MRAM OR MAG?????? (2N) (RAM OR MEMOR????)
S2	2280	SDT OR (SPIN(N)DEPEND?????) (N)TUNNEL????
S3	82	S1 AND S2
S4	45	RD (unique items)
S5	1806438	PLANAR? OR TRUNCATE? OR MESA? ? OR TABLE OR TABLES OR TABL- ETOP? ? OR FLAT???????
S6	1000559	PEAK? ? OR CRAG??? OR PINNACLE? ? OR CREST????
S7	0	S4 AND S5 AND S6
S8	6	S1:S2 AND S5 AND S6
S9	1350	MRAM OR MAGNETIC(2N) (RAM OR RANDOM(N)ACCESS)
S10	0	S9 AND S5 AND S6
S11	74	S9 AND S2
S12	0	S6 AND S11
S13	117	(SHAP???? OR TOPOG?????) AND S9
S14	4	S5 AND S13
S15	1	RD (unique items)
S16	12	CC=(B1265D AND B3120W)

Set	Items	Description
S1	2280	SDT OR (SPIN(N)DEPEND????) (N)TUNNEL????
S2	1955950	PLANAR? OR TRUNCATE? OR MESA? ? OR TABLE OR TABLES OR TABLETOP? ? OR FLAT????? OR ROUND??????
S3	2365801	PEAK? ? OR CRAG??? OR COLUMN??? OR POST? ? OR PINNACLE? ? - OR CREST????
S4	1424	MRAM OR MAGNET????????(2N) (RAM OR RANDOM(N)ACCESS)
S5	1561701	(SHAP???? OR TOPOG?????)
S6	47479	CC=(B3120J OR B3110M OR B3120B OR B1265D OR A7570C OR A7340G AND B3120W)
S7	58025	(ION OR SPUTTER?) (2N) (ETCH???? OR MILL????)
S8	8885	(FERROMAGNET? OR FM) (2N)COUPL?
S9	66884	S7:S8
S10	5314	S9 AND S5
S11	697	S2 AND S10
S12	0	S11 AND S1
S13	64	S11 AND S3
S14	697	S11 AND S2
S15	2	S13 AND S8
S16	2	RD (unique items)
S17	62	S13 NOT S16
S18	41	RD (unique items)
S19	0	S18 AND (S1 OR S4)
S20	41	S14 AND S18
S21	0	(S1 OR S4) AND S20
S22	0	(S1 OR S4) AND S14

File 2:INSPEC 1969-2004/Feb W5
(c) 2004 Institution of Electrical Engineers
File 6:NTIS 1964-2004/Mar W1
(c) 2004 NTIS, Intl Cpyrght All Rights Res
File 8:Ei Compendex(R) 1970-2004/Feb W5
(c) 2004 Elsevier Eng. Info. Inc.
File 25:Weldasearch 1966-2002/Sep
(c) 2004 TWI Ltd
File 34:SciSearch(R) Cited Ref Sci 1990-2004/Mar W1
(c) 2004 Inst for Sci Info
File 434:SciSearch(R) Cited Ref Sci 1974-1989/Dec
(c) 1998 Inst for Sci Info
File 35:Dissertation Abs Online 1861-2004/Feb
(c) 2004 ProQuest Info&Learning
File 65:Inside Conferences 1993-2004/Mar W1
(c) 2004 BLDSC all rts. reserv.
File 94:JICST-EPlus 1985-2004/Feb W5
(c)2004 Japan Science and Tech Corp(JST)
File 99:Wilson Appl. Sci & Tech Abs 1983-2004/Feb
(c) 2004 The HW Wilson Co.
File 103:Energy SciTec 1974-2004/Feb B2
(c) 2004 Contains copyrighted material
File 144:Pascal 1973-2004/Feb W5
(c) 2004 INIST/CNRS
File 239:Mathsci 1940-2004/Apr
(c) 2004 American Mathematical Society
File 241:Elec. Power DB 1972-1999Jan
(c) 1999 Electric Power Research Inst.Inc
File 305:Analytical Abstracts 1980-2004/Mar W1
(c) 2004 Royal Soc Chemistry
File 315:ChemEng & Biotec Abs 1970-2004/Feb
(c) 2004 DECHEMA
File 354:Ei EnCompassLit(TM) 1965-2004/Feb W5
(c) 2004 Elsevier Eng. Info. Inc.
File 987:TULSA (Petroleum Abs) 1965-2004/Mar W2
(c)2004 The University of Tulsa

17/9/2

DIALOG(R) File 2:INSPEC

(c) 2004 Institution of Electrical Engineers. All rts. reserv.

6235916 INSPEC Abstract Number: A1999-11-0755-006, B1999-06-7230-020

Title: Artificial antiferromagnetic tunnel junction sensors based on Co/Ru/Co sandwiches

Author(s): Tiusan, C.; Hehn, M.; Ounadjela, K.; Henry, Y.; Hommet, J.; Meny, C.; van den Berg, H.; Baer, L.; Kinder, R.

Journal: Journal of Applied Physics Conference Title: J. Appl. Phys. (USA) vol.85, no.8 p.5276-8

Publication Date: 15 April 1999 Country of Publication: USA

CODEN: JAPIAU ISSN: 0021-8979

Conference Date: 9-12 Nov. 1998 Conference Location: Miami, FL, USA

Document Number: S0021-8979(99)49508-8

Abstract: A novel method is used for pinning the magnetization of the magnetically hard subsystem in micron-size magnetic tunnel junctions: the so-called artificial antiferromagnetic structure. The latter uses the strong antiparallel exchange coupling between two Co layers through a Ru spacer layer to ensure a high rigidity of the hard subsystem magnetization. The tunnel barriers were formed by **sputter etching** previously deposited Al layers in a rf Ar/O/sub 2/ plasma. Wafers, 3 in. in diameter, were patterned into arrays of square junctions with lateral sizes of 20 and 50 μ m. All junctions of a given size show resistances reproducible within several percents. The tunnel magnetoresistance (TMR) is found to be independent of the junction size and TMR ratios of 14%-16% are achieved at room temperature. (10 Refs)

Subfile: A B

Descriptors: antiferromagnetic materials; cobalt; exchange interactions (electron); magnetic multilayers; magnetic sensors; magnetisation; magnetoresistive devices; ruthenium; **sputter etching**; tunnelling

Identifiers: Co/Ru/Co sandwiches; artificial antiferromagnetic tunnel junction sensors; micron-size magnetic tunnel junctions; hard-soft magnetic scheme; magnetization pinning; antiparallel exchange coupling; Ru spacer layer; hard subsystem magnetization; tunnel barriers; **sputter etching**; rf Ar/O/sub 2/ plasma; Al layers; wafer patterning; square junction arrays; lateral size; tunnel magnetoresistance; TMR ratios; high-impedance magnetic sensors; large field window; **spin dependent tunnelling** structures; 3 in; 20 μ m; 50 μ m; Co-Ru-Co-Al/sub 2/O/sub 3/-Co-Fe; Al

Class Codes: A0755 (Magnetic instruments and techniques); A7550R (Magnetism in interface structures); **A7570C** (Interfacial magnetic properties); A7550E (Antiferromagnetics); A7560E (Magnetization curves, hysteresis, Barkhausen and related effects); A7215G (Galvanomagnetic and other magnetotransport effects (metals/alloys)); B7230 (Sensing devices and transducers); B7310L (Magnetic variables measurement); **B3110M** (Magnetic multilayers); **B3120J** (Magneto-acoustic, magnetoresistive, magnetostrictive and magnetostatic wave devices)

Chemical Indexing:

Co-Ru-Co-Al₂O₃-Co-Fe int - Al₂O₃ int - Al₂ int - Al int - Co int - Fe int - O₃ int - Ru int - O int - Al₂O₃ bin - Al₂ bin - Al bin - O₃ bin - O bin - Co el - Fe el - Ru el (Elements - 1,1,1,2,1,1,5)

Al sur - Al el (Elements - 1)

Numerical Indexing: size 7.6E-02 m; size 2.0E-05 m; size 5.0E-05 m

Copyright 1999, IEE

17/9/3

DIALOG(R) File 2:INSPEC

(c) 2004 Institution of Electrical Engineers. All rts. reserv.

6167838 INSPEC Abstract Number: A1999-06-7570P-016, B1999-03-3110M-008

Title: Observation of large low field magnetoresistance in ramp-edge tunneling junctions based on doped manganite ferromagnetic electrodes and a SrTiO/sub 3/ insulator

Author(s): Kwon, C.; Jia, Q.X.; Fan, Y.; Hundley, M.F.; Reagor, D.W.; Hawley, M.E.; Peterson, D.E.

Conference Title: Science and Technology of Magnetic Oxides Symposium
p.237-42

Publisher: Mater. Res. Soc, Warrendale, PA, USA

Publication Date: 1998 Country of Publication: USA xiii+360 pp.

Conference Title: Science and Technology of Magnetic Oxides Symposium

Conference Date: 1-4 Dec. 1997 Conference Location: Boston, MA, USA

Abstract: We report the fabrication of ferromagnet-insulator-ferromagnet junction devices using a ramp-edge geometry based on (La/sub 0.7/Sr/sub 0.3/)MnO/sub 3/ ferromagnetic electrodes and a SrTiO/sub 3/ insulator. The multilayer thin films were deposited using pulsed laser deposition and the devices were patterned using photolithography and ion milling. As expected from the **spin-dependent tunneling**, the junction magnetoresistance depends on the relative orientation of the magnetization in the electrodes. The maximum junction magnetoresistance (JMR) of 30% is observed below 300 Oe at low temperatures (T<100 K). (7 Refs)

Subfile: A B

Descriptors: colossal magnetoresistance; ferromagnetic materials; lanthanum compounds; magnetic multilayers; magnetisation; photolithography; pulsed laser deposition; **sputter etching**; strontium compounds; tunnelling

Identifiers: large low field magnetoresistance; ramp-edge tunneling junctions; doped manganite ferromagnetic electrodes; SrTiO/sub 3/ insulator; ferromagnet insulator-ferromagnet junction devices; ramp-edge geometry; (La/sub 0.7/Sr/sub 0.3/)MnO/sub 3/ ferromagnetic electrodes; multilayer thin films; pulsed laser deposition; photolithography; ion milling; **spin-dependent tunneling**; junction magnetoresistance; magnetization; 100 K; (La/sub 0.7/Sr/sub 0.3/)MnO/sub 3/-SrTiO/sub 3

Class Codes: A7570P (Enhanced magnetoresistance in magnetic films and multilayers); A7550D (Ferromagnetism of nonmetals); A7550R (Magnetism in interface structures); **A7570C** (Interfacial magnetic properties); A7220M (Galvanomagnetic and other magnetotransport effects (semiconductors/insulators)); A8115I (Pulsed laser deposition); A5275R (Plasma applications in manufacturing and materials processing); A8160 (Corrosion, oxidation, etching, and other surface treatments); A7560E (Magnetization curves, hysteresis, Barkhausen and related effects); **B3110M** (Magnetic multilayers); B3110C (Ferromagnetic materials); B0520H (Pulsed laser deposition)

Chemical Indexing:

La0.7Sr0.3MnO3-SrTiO3 int - La0.7Sr0.3MnO3 int - SrTiO3 int - La0.7 int - Sr0.3 int - TiO3 int - La int - Mn int - O3 int - Sr int - Ti int - O int - La0.7Sr0.3MnO3 ss - SrTiO3 ss - La0.7 ss - Sr0.3 ss - TiO3 ss - La ss - Mn ss - O3 ss - Sr ss - Ti ss - O ss (Elements - 4,3,5)

Numerical Indexing: temperature 1.0E+02 K

Copyright 1999, IEE

17/9/4

DIALOG(R) File 2:INSPEC

(c) 2004 Institution of Electrical Engineers. All rts. reserv.

5935488 INSPEC Abstract Number: A9814-7570-006, B9807-3110M-006

Title: Observation of spin-dependent transport and large magnetoresistance in La/sub 0.7/Sr/sub 0.3/MnO/sub 3//SrTiO/sub 3//La/sub 0.7/Sr/sub 0.3/MnO/sub 3/ ramp-edge junctions

Author(s): Kwon, C.; Jia, Q.X.; Fan, Y.; Hundley, M.F.; Reagor, D.W.

Journal: Journal of Applied Physics Conference Title: J. Appl. Phys. (USA) vol.83, no.11 p.7052-4

Publication Date: 1 June 1998 Country of Publication: USA

CODEN: JAPIAU ISSN: 0021-8979

Document Number: S0021-8979(98)20411-7

Abstract: We have fabricated ferromagnet-insulator-ferromagnet junctions using a ramp-edge geometry based on (La/sub 0.7/Sr/sub 0.3//MnO/sub 3/ ferromagnetic electrodes and a SrTiO/sub 3/ insulator. Pulsed laser deposition was used to deposit the multilayer thin films and the devices were patterned using photolithography and ion milling. As expected from the **spin-dependent tunneling**, the junction magnetoresistance is dependent on the relative orientation of the magnetization in the electrodes. A junction magnetoresistance (JMR) as large as 30% is observed at low temperatures and low fields. In addition, we have found that JMR is reduced at high temperatures ($T > 100$ K) and decreases monotonically with increasing field at high fields ($0.5 \text{ T} < H < 1 \text{ T}$). Possible causes for these are also discussed. (13 Refs)

Subfile: A B

Descriptors: ferromagnetic materials; giant magnetoresistance; lanthanum compounds; magnetic multilayers; magnetisation; photolithography; pulsed laser deposition; **sputter etching**; strontium compounds; tunnelling

Identifiers: spin-dependent transport; large magnetoresistance; La/sub 0.7/Sr/sub 0.3/MnO/sub 3//SrTiO/sub 3//La/sub 0.7/Sr/sub 0.3/MnO/sub 3/ ramp-edge junctions; ferromagnet-insulator-ferromagnet junctions; ramp-edge geometry; (La/sub 0.7/Sr/sub 0.3//MnO/sub 3/ ferromagnetic electrodes; SrTiO/sub 3/ insulator; pulsed laser deposition; multilayer thin films; photolithography; ion milling; **spin-dependent tunneling**; junction magnetoresistance; relative orientation; magnetization; 100 K; 0.5 to 1 T; La/sub 0.7/Sr/sub 0.3/MnO/sub 3/-SrTiO/sub 3/-La/sub 0.7/Sr/sub 0.3/MnO/sub 3

Class Codes: A7570F (Magnetic ordering in multilayers); A7550D (Ferromagnetism of nonmetals); A7550R (Magnetism in interface structures); A8115I (Pulsed laser deposition); A7560E (Magnetization curves, hysteresis, Barkhausen and related effects); A7220M (Galvanomagnetic and other magnetotransport effects (semiconductors/insulators)); **A7340G** (Tunnelling: general); **B3110M** (Magnetic multilayers); B3110C (Ferromagnetic materials); B0520F (Vapour deposition

Chemical Indexing:

La0.7Sr0.3MnO3-SrTiO3-La0.7Sr0.3MnO3 int - La0.7Sr0.3MnO3 int - SrTiO3 int - La0.7 int - Sr0.3 int - TiO3 int - La int - Mn int - O3 int - Sr int - Ti int - O int - La0.7Sr0.3MnO3 ss - SrTiO3 ss - La0.7 ss - Sr0.3 ss - TiO3 ss - La ss - Mn ss - O3 ss - Sr ss - Ti ss - O ss (Elements - 4,3,4,5)

Numerical Indexing: temperature 1.0E+02 K; magnetic flux density 5.0E-01 to 1.0E+00 T

Copyright 1998, IEE